Project Plan for Bangkit 2022 Product-based Capstone

Team ID : C22-PS123

Active Team Member:

- **(ML) M2297F2543 - Dhiemas Ady Kusuma Wardana - Universitas Pembangunan Nasional Veteran Yogyakarta**
- **(ML) M7312F2706 - Muhammad Zidni Subarkah - Universitas Sebelas Maret**
- **(ML) M2313F2719 - Ricky Indra Gunawan - Universitas Siliwangi**
- **(MD) A2297F2535 - Risang Panggalih - Universitas Pembangunan Nasional Veteran Yogyakarta**
- **(MD) A2297F2537 - Shean Michael Aqshafa Ditamaputra - Universitas Pembangunan Nasional Veteran Yogyakarta**
- **(CC) C2271F2349 - Muhammad Fahmi - Universitas Multimedia Nusantara**

Inactive Team Member: -

Final Selected Themes

- Education, Training, Upskilling & Research (including Competitive Human Resources)

Title of the Project:

Rayuan (Rate your handwriting)

Executive Summary/Abstract:

Writing by hand boosts your ability to retain information, comprehend new ideas, and be more productive. Studies show that writing improves memory; students retain learning better when working with new ideas through handwriting instead of typing. After being taught in school, students should be relatively competent in handwriting. Unfortunately, this is not the case in reality. Many people face difficulties with improving their handwriting skills. Additionally, typing on a keyboard has made people disregard having good handwriting these days. Consequently, we may encounter unreadable handwriting. Therefore, we decided to do the project with following objectives:

1. Find method to detect and rate people's handwriting using transfer learning model;
2. Predict people's handwriting quality;
3. Deciding the best machine learning model to solve this problem.

Project Plan for Bangkit 2022 Product-based Capstone

One way to improve handwriting is practice. But, practicing handwriting might be inefficient because it needs another person to rate the handwriting. Besides, people may feel insecure to show their handwriting to others. An android application might be sufficient to help improve handwriting. To summarize, bad handwriting may exist because of different causes like habit, background, etc. With objectives as mentioned before, we intend to help people in improving their handwriting.

How did your team come up with this project?
We discussed many issues that could be solved through our app. This idea came from a problem that we see often: that many people suffer from bad handwriting. Many feel insecure because their handwriting is difficult to read or unreadable. There is also a condition called Dysgraphia where victims have an inability to handwrite, which often leads to lowered study motivation. This is why we chose to develop an app to rate the quality of handwriting. We hope that our app may help people improve their handwriting.

Project Scope & Deliverables:
This Rayuan application development activities is carried out in the form of making Android-based application modules through the stages of initiation, research, design, development, integration, testing, and deployment. There is coordination in a team between Machine Learning division, Android Development division and Cloud Computing division so that they can design and build applications according to the expected goals and objectives with the following scope of work.

After doing concept development and feasibility study, the Machine Learning division will find and collect datasets and preprocess them to be used for training our proposed model and then proceed with model validation. The model will be deployed to the Android App using TFLite and the process will be continued by the Cloud Computing and Android Development division.

Our Android Development division will make a user flow to be used as a reference. Then, the design will be developed with Figma creating wireframes and mockups. The process continued into developing the application in Android Studio based on the Figma project. The Android Studio project needs to be able to capture a picture, send it to an API, and get a rating given by the API. Those functions will be developed using the Kotlin programming language. Afterwards, a test needs to be done to see the result.

Project Plan for Bangkit 2022 Product-based Capstone

On the cloud computing side there will be three main tasks, which are; Integrating the machine learning model from the Machine Learning team to the API, Monitoring API performance, and tracking usages.

After completing each division task, we test the application. The test includes an end-to-end test and acceptance test. If all the test results are satisfactory, we are ready to launch the application for public use.

The project scope contains activities that must be carried out, which include:

WBS code	Task	Duration
1	**Initiation**	**2 Days**
1.1	Concept development	1 Day
1.2	Feasibility study	1 Day
2	**Research**	**4 Days**
2.1	Survey	2 Days
2.2	Datasets research	2 Days
3	**Designing**	**4 Days**
3.1	User Flow	1 Day
3.2	Wireframe	1 Day
3.3	Mockup Prototype	2 Days
4	**Development**	**7 Days**
4.1	Build & Train ML Model	1 Day
4.2	Developing Android XML layout	1 Day
4.3	Developing Android app based on design using Kotlin	4 Days
4.4	Configuring API	1 Day

Project Plan for Bangkit 2022 Product-based Capstone

5	**Integration**	**4 Days**
5.1	Application & API integration	4 Days
6	**Testing**	**4 Days**
6.1	End-to-end test	2 Day
6.2	Acceptance test	2 Day
7	**Deployment**	**7 Days**
7.1	Launching	7 Days

Project Schedule:

No	Activities	Duration (Days)	Timeline (Week)			
			1	2	3	4
1	Initiation	2	2			
2	Research	4	4			
3	Designing	4	4			
4	Development	7	1	6		
5	Integration	4		1	3	
6	Testing	4			4	
7	Deployment	7				7

Critical time
Slack time
Float time
1 Week = 7 Workdays (24/7)

Project Plan for Bangkit 2022 Product-based Capstone

Based on your team's knowledge, what tools/IDE/Library and resources that your team will use to solve the problem?
Cloud: Google Cloud Platform, Firebase, Postman, Swagger
Machine learning: TensorFlow, Keras, Pytorch, TFLite, Pandas, Numpy, Flasks
Android: Android Studio, Figma, Glide, Retrofit2, Kotlin Coroutines

Based on your knowledge and explorations, what will your team need support for?
Mentor, GCP balance, Dataset (if possible)

Based on your knowledge and explorations, tell us the Machine Learning Part of your capstone?
The dataset will be divided into training and testing data. Build and train our proposed Regression CNN model using transfer learning such as VGG-16, ResNet50V2, etc and then proceed with model validation. Save the model and convert it using TFLite to deploy models on a mobile device.

Based on your knowledge and explorations, tell us the Mobile Development Part of your capstone?
UI/UX will be designed and utilized as a reference for the application. Then, the process goes into developing the application with Kotlin programming language. Testing the application to see if there are any bugs within the application. Evaluate the application to see if it works as intended.

Based on your knowledge and explorations, tell us the Cloud/Web/Frontend/Backend Part of your capstone?
Creating and configuring API and API documentation for the Machine Learning model that we created as a back-end service as well as testing, deploying, tracking, and monitoring the API to the GCP.

Based on your team's planning, is there any identifiable potential Risk or Issue related to your project?
- DDoS attack by hackers. Solution: Using load balancer.
- Libraries do not work as intended. Solution: Might use libraries outside the project plan.
- UI/UX incapable of being applied into application. Solution: simplify UI/UX design.
- UI/UX made application functionality unusable. Solution: simplify UI/UX design.
- We lack a dataset to train AI models. Solution: Might help us to add the data.

Project Plan for Bangkit 2022 Product-based Capstone

- Service down. Solution: Deploy across multiple zones.
- The AI model may not be compatible with the app. Solution: Using lightweight model
- Exploding hardware. Solution: Upgrading hardware.

Any other notes/remarks we should consider on your team's application

We want to be a part of education development in Indonesia by creating this application. Because good handwriting is still needed as credential documentation such as exams in school, form in teller bank, and other things related to documents that need to be readable. On the other hand, good handwriting could help others to feel confident to write. We are determined to provide a solution which is expected to have useful and long-lasting impacts in a manner that we can improve the user's handwriting using machine learning models that we proposed. Lastly, we love the Bangkit Academy Program.